

subdued the Bantu coast people and the Arab half-breeds to the shores of the Indian Ocean.

All observers of the Masai have noted their superiority in physical appearance to the pure-blooded negro. There has evidently been a good deal of intermixture, especially during the last three decades, with women of Bantu race, and the original Masai stock itself is only one of the many hybrids between the Caucasian and the negro; but still the average man or woman of Masai race is a negroid rather than a negro, with a skin of coppery-brown, not black,¹ with a more defined bridge to the nose and a better developed chin than the ordinary negro possesses. They are, however, far more negro in appearance than, for example, the Hamitic (Hima) aristocracy of the lands lying to the north, west and south of the Victoria Nyanza; yet they retain a larger infusion of Caucasian blood (due, of course, to Hamitic intermixture) than the pure type of Nilotic negro, to which in other respects they are nearest allied in origin, language, and, above all, in habits and customs.

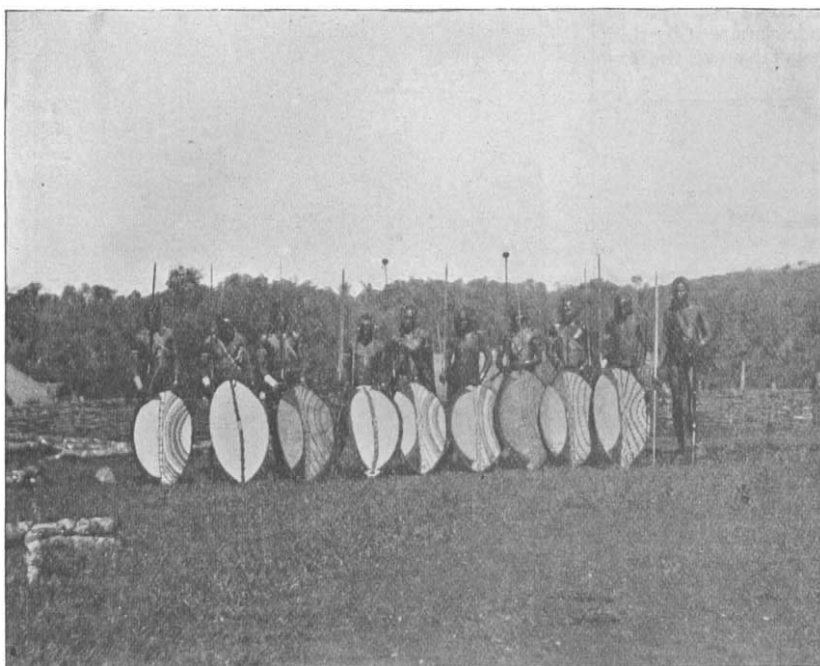


FIG. 2.—Masai warriors of various "ages" and "districts," each with the shield of his "age" and "district." From Hollis's "The Masai."

Now that our knowledge of eastern equatorial Africa is so extensive, we realise that the Masai are no isolated phenomenon in racial distribution, but are simply a southward extension of the Nilotic peoples. They probably originated several hundred years ago in the northern part of the present Uganda Protectorate, in the mountainous country between the present abode of the Lotuka tribe (the nearest allies of the Masai in language) and the Turkana peoples to the east. In this region they were simply one of the many blends between the Hamitic (Gala) invaders of equatorial Africa and the Nile negroes. The writer of this review, in his work on the Uganda Protectorate (p. 841), has computed that the proportion of Caucasian intermixture in the case of the Masai is from one-quarter to one-eighth. Their language, which for classification

may be grouped with the Lotuka, Elgumi or Wamia, Bari (on the White Nile), Karamojo, and Turkana, is, together with the nearly allied group of the Nandi-Dorobo, distinctly, though distantly, related to the well marked Nilotic family of negro languages which includes the Dinka, Shiluk, Dyur, Acholi, &c., and links on to the negro languages stretching away to Wadai and Lake Chad. In the Masai language, as in the kindred tongues of the Masai group, there is distinct evidence of Somali or Gala influence. This may be due to the ancient intermixture of blood between the Gala and the Nilotic negro which formed the Masai, and also to the contiguity of the Masai in some of their wanderings with outlying groups of Hamitic people.

For the first time the civilised world has been presented with an authoritative work on the Masai language, customs, and folklore, by Mr. A. C. Hollis, of the British East Africa Protectorate. Nothing of the kind worth serious notice has appeared since the works of Krapf and Erhardt. Though a Masai dictionary

remains to be composed which shall give a full vocabulary of this interesting language, the book under review can scarcely be bettered in fulness or correctness as a grammatical study. Equally admirable is the collection of Masai legends. These are not given in the form of generalised "stories" with a Hans Andersen flavour; but the original is first of all presented in the Masai with an interlinear translation, and then follows a correct but more readable version in colloquial English. Of necessity, a work like this is more interesting to students than to the general public (though it is admirably illustrated with appropriate photographs). But for the students of African ethnology and languages it is a work of permanent value; it is the authoritative study of the Masai people; and it is satisfactory to record that the author confines himself mainly to facts and not to theories, and that Sir Charles Eliot in his introduction does not trace the origin of the Masai to the ten lost tribes of Israel. A

recrudescence of this irritating mania having recently appeared amongst German writers on Africa who ought to have known better, it is a relief to find that English authorities on African questions can still retain their sanity on the subject of the proper place in history and ethnology of that mixed Armenian, Dravidian, and Semitic people which we call by the racial name of Jew.

H. H. JOHNSTON.

NOTES.

THE anniversary dinner of the Royal Geographical Society on Monday was really a complimentary banquet to Sir Clements Markham, the popular and active president of the society, who has just retired from office after twelve years of zealous service. During this period Sir Clements Markham has watched over the affairs of the society, and has guarded the interests of geography, with a devotion

¹ Owing to their habit of smearing their bodies with a red clay, they strike the casual observer as being a red-skinned rather than a brown race.

and untiring energy which it is easier, to admire than to emulate. But his influence has not only been exerted while directing the affairs of the society as president, for he was honorary secretary of the society from 1863 to 1888, and the Founder's medal awarded to him upon his retirement was a mark of appreciation of his work for the promotion of geography, both in connection with the society and otherwise. It is, indeed, difficult to think of the Royal Geographical Society apart from the personality of Sir Clements Markham, for in all the affairs of the society he has long been ubiquitous. Wherever and whenever geographical interests could be advanced, he has championed them with a strength of view and courage of conviction which have commanded the admiration even of those who have differed from him. He has always been jealous of the honour of his charge; and only those who have been closely associated with him can appreciate adequately how carefully he has cherished the society's welfare. At the banquet on Monday, the chairman, Sir George D. T. Goldie, who has succeeded Sir Clements Markham in the presidential chair, referred in eloquent terms to Sir Clements' work as explorer and author, and his great achievement in the introduction of the cultivation of the Cinchona plant from South America into India. Messages of regret upon the retirement of Sir Clements Markham were read from the King and the Prince of Wales. After Sir Clements had replied to the toast of his health, a testimonial was presented to him from the relatives of the officers and members of the scientific staff of the *Discovery* in recognition of his courtesy in keeping up communication with them. This souvenir consisted of a reproduction of the Cashel cup, and bore a suitable inscription. There was also a gold pin studded with jewels for Lady Markham.

MM. METSCHNIKOFF and ROUX, who have recently shown that syphilis is inoculable on the higher apes, at a meeting of the French Academy of Medicine on May 16 announced that they have at last detected the microorganism of this disease. The microbe appears to be a long, delicate, spirillar form, difficult to observe, and readily destroyed by any manipulations. It seems to have been seen first by MM. Bordet and Gengou, of the Pasteur Institute, three years ago, and subsequently by Herren Schaudinn and Hoffmann, by whom it was named *Spirochaete pallida*. It measures 4-14 μ in length by 1 μ in breadth, and though resembling similar organisms in mucus, &c., is readily distinguished from these. The spirochæte has been found in four out of six human cases of the disease, and also in the inoculated monkeys, and Dr. Levaditi also exhibited preparations of it obtained from a child suffering from hereditary syphilis.

THE Royal Medical and Chirurgical Society celebrated the centenary of its foundation by a dinner on May 22, which was attended by the Prince of Wales and a large and distinguished company, the president, Sir Douglas Powell, Bart., presiding. In responding to the loyal toasts, the Prince of Wales (who is an honorary Fellow of the Society) expressed his pleasure at being present. He regarded his position as president of King Edward's Hospital Fund as a precious trust, and he watched with keen interest and satisfaction the gradual but steady development of medical science. He congratulated the Society on celebrating the 100th anniversary of its foundation, a period which had been prolific in advances in medicine and surgery. Physiology had become established as a precise branch of learning; bacteriology had laid bare the foundations of disease; antiseptics and the clinical thermometer had been invented;

our hospitals had become institutions in which the most beneficent treatment is carried out with scientific thoroughness; and in the sphere of public hygiene nothing short of a revolution had been effected. Among the guests were the Duke of Northumberland, Lord Strathcona, Lord Alverstone, Sir W. Huggins, P.R.S., Mr. John Tweedy, P.R.C.S., Surgeon-General Keogh, Prof. Ray Lankester, Sir W. Ramsay, Sir F. Treves, Sir P. Manson, Prof. Christian Bohr, Prof. Pierre Marie, and many others. Last night the Fellows and their friends and other guests were entertained at a soirée at the Natural History Museum. As a fitting supplement to the centenary festivities, it may be mentioned that the society recently invited delegates from the other medical societies to confer on the practicability of an amalgamation between the various societies and the foundation of an "Academy of Medicine," such as exists in Paris and other cities.

IN connection with the fiftieth anniversary of the Société des Sciences naturelles de Lucerne, which takes place this year, the Société helvétique des Sciences naturelles will hold its eighty-eighth annual meeting at Lucerne on September 10 to 13 inclusive. The business of the meeting will be carried on in seven sections, dealing respectively with mineralogy and geology, botany, zoology, chemistry, physics and mathematics, medicine, and civil engineering. Lectures to the general assemblies have been promised by Profs. F. Zschokke, A. Heim, and H. Bachmann. Five scientific societies will hold their annual meetings at Lucerne on the same occasion, namely, the Swiss societies of geology, botany, zoology, and chemistry, and the Zurich Physical Society. Full particulars can be obtained by writing to the president of the meeting, Dr. E. Schumacher-Kopp, Adligenschwylerstr., 24, Lucerne.

IN commemoration of the first admission of women to the full fellowship of the Linnean Society, a dinner, was given to the lady fellows of the society on May 18, at the invitation of the treasurer, Mr. F. Crisp.

MR. A. HOWARD has been appointed by the Secretary of State for India economic botanist to the Imperial Department of Agriculture of India. He will be stationed at the experiment station at Pusa, Behar, Bengal.

A COURSE of instruction in oceanic research will be held at Bergen, during the university vacation, from August 8 to October 14. The course, as in previous years, will consist of lectures, practical instruction and assistance in laboratory work; excursions will also be made, during which the use of various appliances and instruments will be practically demonstrated. The work will be in charge of Dr. A. Appellöf, Dr. D. Damas, Dr. H. H. Gran, Mr. B. Helland-Hansen, Dr. Johan Hjort, and Mr. C. F. Kolderup. Further particulars can be obtained from the Oceanographical Institute of Bergen Museum, Bergen, Norway.

THE association which maintains an American woman's table in Dr. Dohrn's marine laboratory at Naples also offers at stated times a cash prize of 200l. for the best thesis presented by a woman of any nationality embodying original laboratory research. This prize was awarded at the annual meeting in Boston, on April 29, to Miss N. M. Stevens for a paper on the germ cells of *Aphis rosea* and *Aphis oenothera*. The theses offered in competition for the next prize should be presented to the executive committee of the association, and must be in the hands of the chairman of the committee on the prize, Mrs. Eilen H. Richards, Massachusetts Institute of

Technology, Boston, Mass., before December 31, 1906. The prize will be awarded at the annual meeting in April, 1907.

At the meeting of the Pathological Society of London on May 16, Mr. C. Walker gave a demonstration which seems to solve the nature of the so-called "cancer bodies" (Ruffer's bodies) of malignant tumours, which have been believed by many to be parasitic protozoa. He showed specimens of the normal reproductive cells of the testis containing bodies which are apparently identical with the "cancer bodies," but are really the archoplasmic vesicles of those cells.

In the *Bulletin of the Johns Hopkins Hospital* for April (xvi., No. 169) the most interesting and important communication is by Dr. Clowes on the immunisation of mice against cancer. In certain mice which had been inoculated with mouse cancer, the disease underwent an unexpected and spontaneous retrogression, and it was found that the serum of these animals produced a marked curative effect on the cancerous tumours in other mice suffering from the disease.

DR. W. B. WHERRY records some interesting observations on the biology of the cholera spirillum (*Bull. Bureau of Gov. Laboratories, Manila*, No. 19), in which he shows that the slight variations in cultural and other characters so often met with in different strains of this micro-organism are largely due to slight differences in the culture media employed, particularly in their reaction, and suggestions are given for the more accurate preparation of standard media.

THE *Journal of the Royal Sanitary Institute* (xxvi., No. 4) contains a report of a discussion on the aerial dissemination of small-pox round small-pox hospitals, in the course of which Dr. H. E. Armstrong, Dr. T. M. Clayton, and others adduce a good deal of evidence against the commonly accepted view of the danger of aerial infection in the neighbourhood of such hospitals. Municipal milk depôts and milk sterilisation is the subject of another paper by Dr. G. F. McCleary.

DR. CHARLES CREIGHTON, who recently paid a special visit to India for the purpose of inquiring on the spot into some of the circumstances connected with the prevalence of plague, read a paper on this disease before the Society of Arts on May 18. Dr. Creighton first criticised the composition of the British Plague Commission of 1898, complaining that there was no epidemiologist upon it. He next gave a somewhat detailed account of the geographical distribution of plague, and directed attention to the difference of incidence of the disease in the villages of the district of Ratnagiri and those of the adjoining district of Satara. In the former all the buildings, roads, &c., are of stone, and plague occurs little or not at all; in the latter the villages are plague-stricken, and the crowded dwellings are of mud, the floors, &c., being saturated with offal. Dr. Creighton believes that crowded sites too long inhabited and without drainage are the cause of the trouble, which is explicable on the laws of soil-infection enunciated by Pettenkofer and his school.

A PRICED catalogue of pinned specimens of Lepidoptera, issued by Mr. H. Fruhstorfer, of Turmstrasse, Berlin, from whom we have received a copy, should prove useful to collectors.

AMONG our weekly budget are included three papers on North American zoology. In the first, from the *Bulletin of the Brooklyn Institute* (vol. i., No. 5), published by the

Macmillan Company, Dr. J. A. Allan gives a list of mammals from Beaver county, Utah, several of which are described as new. The mammals of this elevated region are stated to differ considerably from their representatives in the adjacent foot-hills. In No. 6 of the same serial Mr. C. Schaefer describes new American beetles, and in the third paper (from the *Proceedings of the U.S. Museum*) Mr. W. D. Kearfoot diagnoses new tortricine moths from Carolina.

In the April issue (vol. i., part iv.) of the *Records of the Albany Museum* Dr. R. Broom discusses the proper signification of the Owenian term "Anomodontia," and comes to the conclusion that it is applicable only to the cynodonts. He also describes certain new fossil reptiles from Aliwal North, and contributes some important notes on the localities of type specimens of other South African reptiles, especially those in the British Museum. In the course of these remarks, it is pointed out that Anthodon is of Wealden age, and probably, therefore, a dinosaur instead of a pariasaurian, and that the limb-bones described by Owen as *Platypodosaurus* are almost certainly referable to *Udenodon*.

In the issue of *Biologisches Centralblatt* of May 1 the Rev. Father Wasmann brings to a close his important series of articles as to the origin of slavery among ants, and formulates the conclusions at which he has arrived, which are too long to be recapitulated in our columns at length. It may be mentioned, however, that, in the author's opinion, this system of slavery had independent origins at different dates respectively in the formicine and the myrmecine sections of the ant family, and that it has also been independently acquired in different genera and species of these two subfamilies at different times. In general, it seems to have been of later origin in the Formicinae than in the Myrmecinae. Moreover, the phenomenon affords confirmation of the biological doctrine that the ontogeny of a group constitutes a brief recapitulation of its phylogeny. In another article in the same issue Dr. O. Zacharias emphasises the importance of modern methods of studying "hydrobiology" in relation to fish-culture and fisheries.

PART iii. of vol. xlvii. of the quarterly issue of *Smithsonian Miscellaneous Contributions* contains an article by Mr. C. D. Sherborn on the species of birds described as new in Vroeg's catalogue, published in 1764. P. S. Pallas is believed to be the real author of the names. The only copy of this work that has come under the author's notice is in the library of the Linnean Society, where it might have been left in well merited obscurity. Social spiders (*Stegodyphus sarasinorum*) form the subject of another article, by Mr. N. S. Jambunathan, in the same serial. The spiders of this species, which was discovered by the author at Saidapet, Madras, in 1898, live in a sponge-like nest formed of branching net-work with communicating canals and a number of external openings. These nests, which may be attached either to the tips of branches of trees or to leaves of the prickly pear, are ashy-grey in colour, and constructed of leaves and refuse from the spiders' food. Externally is a coat of stout sticky threads of the same colour as the spiders themselves, and sheet-like webs spread in all directions from the nests. Five or six nests are often found together, each of which may be the home of from 40 to 100 spiders, usually in the proportion of seven males to one female. A number of spiders will cooperate to overpower a single large insect.

DURING the last few days paragraphs have appeared in the newspapers stating that a plague of flies has invaded Cardiff Docks, causing much inconvenience. The flies are said to have made their appearance with a southerly wind on Sunday, May 14. Mr. Ernest E. Austen, of the British Museum (Natural History), informs us that specimens forwarded to the museum show that the trouble has been caused by the fly known as *Dilophus febrilis*, Linn., a very common British species of the family Bibionidae, met with from April to September, but especially abundant in May. In colour the flies are black, with a shining thorax, and measure about $5\frac{1}{2}$ millimetres, or rather less than a quarter of an inch, in length. As in all Bibionidae, the males are distinguished from the females by the large size of the head, which in the former sex appears from above to be entirely composed of the eyes. Of five specimens sent to the British Museum, all were males. *Dilophus febrilis* breeds in horse and cattle droppings, in which the larvæ—white footless grubs measuring half an inch in length, with a dark brown head capsule at the anterior extremity—are found in small masses. This fly is quite incapable of biting, as are also all the other species of the same family, so far as at present known, though the possession of an elongated proboscis by two Mexican representatives of the genus *Plecia* suggests that there may be forms that suck blood. The occasional occurrence of Bibionidae and other Diptera in immense numbers is well known, and notes on the subject have already appeared in these columns (cf. NATURE, vol. xlviii., 1893, pp. 103, 127, 176). With regard to *Dilophus febrilis*, Mr. J. W. Douglas, writing in the *Entomologist's Monthly Magazine* for 1880 (p. 142), describes a swarm of this species at sea off the Norfolk coast on September 2 of that year. It is stated that the air was obscured by the flies as by a cloud, and that a schooner sailing at about a cable's length from the shore was so covered with them that for five hours persons were unable to remain on deck; the air cleared at about 4 p.m. The cause of these phenomenal swarms is still uncertain, but it is probably to be found in exceptionally favourable climatic conditions, which, by accelerating the growth of the larvæ and shortening the pupal stage, cause myriads of flies to appear at practically the same time.

IN the *Biological Bulletin* (February) Mr. R. S. Lillie discusses the conditions determining the disposition of the chromatic filaments and chromosomes in mitosis, and advances a physicochemical theory, based upon mutual repulsions of the particles of a colloid solution, to explain the sequence of the stages in nuclear division.

A REVISION by Mr. B. Hayata of the Euphorbiaceæ and Buxaceæ of Japan, as represented in the herbarium of the University of Tokio, forms article iii. in vol. xx. of the *Journal of the College of Science* in that university. The number of genera is limited to twenty-four under Euphorbiaceæ and two under Buxaceæ, and seven new species are recorded. The author has provided figures of the flowers for most of the species.

A BRIEF survey of the progress of the Nilambur Teak Plantations, Madras, from its inception by Mr. Conolly in 1840 to its present condition, when the receipts more than balance the cost, is contributed by Mr. R. McIntosh to the *Indian Forester* (March). The harvest time is still thirty-five years ahead, when the fellings are expected to produce a revenue of 40,000l. a year. The difficulty experienced at first in getting the seed to germinate was overcome by soaking the seeds before planting, and by

keeping the soil thoroughly moist after planting. The teak forests of Burma form the subject of another article, in which Mr. R. S. Troup comes to the conclusion that useful as fire protection may be in most forests, annual burning in moist mixed forests of teak and bamboos is decidedly efficacious.

THE appearance of a *Nature-study Review*, edited and published by Mr. M. A. Bigelow in Lancaster, Pennsylvania, indicates that the subject is making progress in the United States. A discussion in the first number as to the scope of nature-study has led to a general expression of opinion that it differs from natural science in so far as it lacks the characteristic organisation of science, and that it should be confined to elementary schools; further articles on the subject appear in the March number, which is the second of a bi-monthly issue. Amongst the articles giving the experiences of teachers one by Dr. E. A. Bigelow directs attention to the convenience of putting up the salts required for plant food solutions in tabloid form.

IN *Spelunca* (Bull. de la Soc. de Spéléologie, tome v., Nos. 39 and 40) there are interesting articles on the caverns and subterranean water-courses of the Mendip Hills, by Mr. H. E. Balch, and on those of the Jura Mountains by M. E. Fournier.

MR. E. C. DAVEY, who in 1874 contributed to the *Transactions of the Newbury District Field Club* an essay on the sponge-gravel beds near Faringdon, with photographs of some of the fossil sponges, has revised and amplified his article under the title "The Neocomian Sponges, Bryozoa, Foraminifera, and other Fossils of the Sponge-gravel Beds at Little Coxwell, near Faringdon." This is now published by Messrs. Dulau and Co., price 5s. net, and it contains five photographic plates of sponges, Echini, and Foraminifera. The nomenclature of the sponges is revised in accordance with the researches of Dr. G. J. Hinde, but the author does not wholly agree with the determinations made by that palæontologist, and adds other species, one new species being figured and briefly described. Under the heading "Bivalves," the author includes brachiopods and lamellibranchs; he makes no reference to the occurrence of Belemnites, to which Mr. G. W. Lamplugh directed special attention in 1903 (*Geol. Mag.*, p. 32).

BASING his conclusions largely on the capacity of the cranium, but also taking into account other characters, Mr. A. da Costa Ferreira has attempted to dissect out, as it were, the probable racial constituents of the Portuguese, and has set forth his results in the *Bulletin de la Société d'Anthropologie de Paris* (5e. sér., tome v., p. 473). He finds a short, mesorhine dolichocephalic type with a small head which he thinks belongs to the Cro-Magnon race, and a tall, leptorhine dolichocephalic type with a large head. The mesaticephals are partly attributed to a brachycephalic mixture; those of short stature, leptorhine, and with a large head, are thought to belong to the race of Grenelle or to a Celtic invasion. The small headed, leptorhine mesaticephals are probably of Semitic origin, while the mesorhines may be of Berber extraction.

IN order to make more widely known and more easily accessible to American students the results of important researches on the Maya hieroglyphs, printed in the German language, the Peabody Museum Committee on Central American Research has begun a series of translations of which the first, on the representation of deities of the Maya manuscripts, by Dr. P. Schellhas, has been published as vol. iv., No. 1, of the *Papers of the Peabody*

Museum, Harvard University. In this valuable enumeration Dr. Schellhas is very careful not to theorise or to go beyond the warrant of the manuscripts themselves. In several cases he refers to diverse views concerning the names of the gods in question; but, as he truly observes, "these different opinions show on what uncertain grounds such attempts at interpretation stand, and that it is best to be satisfied with designating the deities by letters and collecting material for their purely descriptive designation. In vol. iii. of the same *Papers* are illustrated accounts of the Cahokia and surrounding mound groups, by Mr. D. I. Bushnell, and of the exploration of mounds in Coahoma, co. Mississippi, by C. Peabody. In vol. i. Mrs. Zelia Nuttall gives a very interesting account of a penitential rite of the ancient Mexicans mainly derived from Spanish sources. Blood was drawn from cuts in various parts of the body, including the tongue and ears; the rite of voluntarily drawing blood, principally from the ear, was a feature of every-day life in ancient Mexico, and was performed by young and old. It constituted an act of humility, thanksgiving, penitence, or propitiation.

THE Survey Department of Egypt has published an important paper on the rainfall of the Nile basin in 1904, by Captain H. G. Lyons, director-general of the service. Five years ago there were only six or eight places where the rainfall was being measured regularly; now, thanks chiefly to the efforts of Captain Lyons, there are more than forty, of which thirty-two lie to the south of Berber (lat. 18° N.). He points out that to understand the seasonal variation of the rainfall the relative positions of the equatorial low-pressure belt, and the high-pressure areas to the north and south of it at different seasons, must be taken into consideration. In the low-pressure area there is an ascensional movement of the air, so that its moisture is condensed to form clouds and rain. This ascensional movement depends upon the heating effect of the sun, and it is shown month by month how the low-pressure area varies with respect to the sun's position from south to north, and back to south again. The carefully prepared tables and diagrams show, as a general result, that the rainfall of 1904 in the Nile basin was below the average; in the equatorial regions it was somewhat deficient in the earlier part of the year, and above the average in the autumn.

A SOMEWHAT striking paper has been published by Prof. Ronald Ross, F.R.S., of Liverpool University, on verb functions, with notes on the solution of equations by operative division (*Proceedings of the Royal Irish Academy*, xxv., A, 3). The writer points out that whereas symbols such as f and ϕ are used to denote functions in general, no notation exists which can explicitly represent the operation of forming any particular function of any argument, apart from the argument itself, except in certain simple cases as exemplified by the prefixes \log , \sin , &c. The notation proposed by Prof. Ross meets this want. It depends on the use of a purely symbolical letter β to denote the base of a given operation, this symbol occurring in the "verb function" or operator. When this verb function operates on a subject x , it produces the result obtained by writing x for β in the operator. For example, $[\beta^m]^{1/n}(ab) = (ab)^{m/n}$, $[\beta \log \beta - 1]x = x \log x - 1$, $[e^\beta \cos \beta]x = e^x \cos x$, and so on. Another peculiarity is the use of square brackets to enclose each separate operation, the necessity of which may be illustrated by the following example:— $[(a+\beta)^2]x$ represents $(a+x)^2$, whereas

$$[a+\beta]x = [a+\beta][a+\beta]x = [a+\beta](a+x) = a + (a+x) = 2a+x.$$

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In connection with inverse operations, Prof. Ross introduces the notation of a double fraction or solidus line as a distinction from the ordinary division symbol; thus, according to his notation, we should have

$$\frac{1}{[a\beta^2 + b\beta + c]} = -\frac{b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

as the symbolical enunciation of the expressions for the roots of a quadratic equation.

THE peculiar magnetic properties of the so-called Heusler's bronzes, consisting of copper, manganese, and aluminium, are the subject of a paper by E. Take in the *Verhandlungen* of the German Physical Society (vol. vii., 133). The "transformation points" of a number of samples of the bronze were determined, as well as the effect of heating and re-heating upon them. The results are shown in a series of striking curves.

REFERENCE has already been made in these notes (*NATURE*, vol. lxx. p. 583) to the simple form of telescope pyrometer invented by M. Féry for measuring high temperatures. This instrument is now being sold by the Cambridge Scientific Instrument Co., Ltd., who have been appointed sole agents for its sale in the United Kingdom, the British colonies, and in the United States; it is made in two forms, a mirror pyrometer, recording temperatures between 500° C. and 1100° C., and a lens pyrometer, reading between 900° C. and 3500° C.

PROF. MOISSAN has published, in the form of a pamphlet having the title "La Chimie minérale, ses Relations avec les autres Sciences," an address delivered last September at the Congress of Arts and Sciences at St. Louis. Prof. Moissan, who by his own researches and those of his colleagues has so widely enlarged the domains of inorganic chemistry, whilst regretting that this branch of science is still systematically imperfect as compared with organic chemistry, emphasises the fact that during the past few years its study has again resumed a place of honour. This has been due largely to the discovery of the gases of the atmosphere, to research at high and low temperatures, the investigation of the rare earths, and to the increasing tendency to the fusion of chemical and physical methods. "Many important investigations still remain to be made in inorganic chemistry, but for success very refined methods and a high degree of accuracy will be required. Chemical research must acquire the precision of physics." Finally, it must be recognised that experiment is the sole guide to truth, and that Faraday's saying still holds true that chemistry is essentially an experimental science.

THE recent researches of M. Berthelot on the permeability of fused quartz vessels to gases at high temperatures have led him to study glass from the same point of view, with very interesting results. In many analytical processes, and more especially in the analysis of organic compounds, it is tacitly assumed that at temperatures below its melting point glass is impermeable to oxygen, nitrogen, and carbon monoxide and dioxide. In the current number of the *Comptes rendus*, M. Berthelot gives an account of some experiments on glass, the mode of working being the same as that used for the quartz tubes (see *NATURE*, April 13, p. 568) with the exception that the tubes were necessarily slowly cooled, and finds that at temperatures between 550° C. and 800° C. glass tubes are permeable to gases. He compares the passage of gases through slightly softened glass to the gaseous exchanges taking place at the ordinary temperature through the walls of indiarubber tubing, and emphasises the importance of this property of glass, hitherto unsuspected, in many chemical and physical investigations at high temperatures.

MESSRS. CROSBY LOCKWOOD AND SON will publish shortly a work on "Modern Lightning Conductors," by Mr. Killingworth Hedges, honorary secretary of the Lightning Research Committee.

AN appendix to Mr. R. L. Taylor's "Student's Chemistry" has been published by Mr. John Heywood. It consists of two sections; the first part deals with the radio-active elements, and the second is an introduction to the study of organic chemistry.

WE have received from the Art. Institut Orell Füssli, of Zurich, Nos. 177, 178, and 179 of their "Illustrated Europe" series of handbooks. The three parts are bound together in a convenient little volume with the title "Grisons Oberland." The guide book is by Dr. Chr. Tarnuzzer, and a historical sketch has been contributed by Prof. J. C. Muoth. The translation into English was done by Dr. and Mrs. Spöndly-Blakiston. Visitors to this interesting part of Switzerland will find interesting scientific, historical, and topographical information in this guide book. The book may be obtained in this country from Messrs. Hachette and Co.

MESSRS. OLIVER AND BOYD have published the ninth volume of the "Reports from the Laboratory of the Royal College of Physicians, Edinburgh." The volume is edited by Sir J. B. Tuke and Dr. Noël Paton. The papers included fall under two categories; the first comprises fourteen papers describing researches on the ductless glands under the Mason fund, and the second consists of general researches in physiology, pathology, and pharmacology.

WE have received from Mr. John Grant, of Edinburgh, a catalogue of scientific books, chiefly on botany, zoology, and geology, and a catalogue of recent purchases—including some well known works of science—all of which are offered at greatly reduced prices.

MR. W. BUTLER, Southport, has devised a new type of camera stand—called the Swingcam—to facilitate the photography of natural history subjects. The stand enables a photographer to point the lens of a camera at any angle and fix it in that position, without the use of a swinging back or front or any other independent attachment. The Swingcam tripod head can be fixed in a horizontal or vertical position, or at any angle, and is also capable of being inverted if desired. Naturalists and others who occasionally have to use cameras in awkward positions will no doubt find these devices a convenience.

New editions of two standard works already reviewed in these columns have just been received from Mr. Gustav Fischer, Jena. One is the seventh edition of the "Lehrbuch der Botanik" by Profs. Strasburger, Noll, Schenck and Karsten, and the other is the seventh edition of Dr. R. Hertwig's "Lehrbuch der Zoologie." Both works have been revised, so that they will maintain their high position among text-books of science.

WE have received from Messrs. Henry Sotheran and Co., 140 Strand, W.C., a copy of their latest catalogue of second-hand books, including numerous scientific works; and from Messrs. John Wheldon and Co., 30 Great Queen Street, W.C., a catalogue of a miscellaneous collection of books, comprising many dealing with biology, geology, and mathematics.

MESSRS. DAWBARN AND WARD, LTD., have published a second revised edition of "Photographic Failures: Prevention and Cure," by "Scrutator" of the *Photogram*.

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OUR ASTRONOMICAL COLUMN.

NEWLY DISCOVERED NEBULÆ.—In No. 4013 of the *Astronomische Nachrichten* Prof. Max Wolf announces the discovery of a small, but beautiful, nebula the position of which, referred to the equator of 1900-0, is as follows:— $\alpha = 13^{\text{h}}. 58^{\text{m}}. 33.44^{\text{s}}$, $\delta = -9^{\circ} 39' 36''$. This object was discovered on a plate exposed during a search for minor planet (126), Velleda, and is of a spiral form, of the unusual S-shaped variety, the nucleus being of the fourteenth magnitude. Its diameter in R.A. is about $0'.75$, and in dec. about $1'.0$.

A second nebula of especial interest was found in the position (1900-0) R.A. $= 13^{\text{h}}. 58^{\text{m}}. 15.17^{\text{s}}$, $\delta = -9^{\circ} 40' 10''$. This object is $1'$ in length along its major axis, which has a position angle of about 120° , and is of the Andromeda nebula form.

THE BRUCE TELESCOPE REFERENCE PHOTOGRAPHS.—When the 24-inch Bruce telescope of the Harvard College Observatory was being planned it was expected that the instrument might be useful in assisting in the discoveries of new satellites, and this expectation was realised in the discovery of Phœbe. A number of plates of each planet have been taken since 1893, and of these Prof. Pickering now gives the details as to object photographed, exposure, date and region, in Circular No. 97 of the Harvard College Observatory, hoping that the knowledge of their existence may assist other observers of possible satellites. The list includes 12 plates exposed for Mercury, 2 for Mars, 6 for Vesta, 21 for Jupiter, 12 for Uranus, and 3 for Neptune. The Saturn plates were fully described when the manner of the discovery of Phœbe was related in a former publication. The limiting magnitude of the objects shown on these plates may be taken as 17.0 or 17.5, and therefore the photographs may prove useful in the correction of the elements of Jupiter's newly discovered satellites when more is known of the positions of these two objects.

COMET 1904 II. (1904 d).—A continuation of the ephemeris for comet 1904 d is given in No. 4012 of the *Astronomische Nachrichten* by Herr M. Ebell.

This comet is now only about one-sixth as bright as when discovered, and is gradually becoming fainter. Its position on May 26, according to the ephemeris, will be α (true) $= 2^{\text{h}}. 23^{\text{m}}. 48^{\text{s}}$, δ (true) $= +64^{\circ} 50'$, which is about 2° south of ϵ Cassiopeiæ, and the object is travelling slowly towards the constellation Camelus with a very slightly increasing declination.

TWELVE STARS WITH VARIABLE RADIAL VELOCITIES.—Further results of the spectrographic work performed by the D. O. Mills expedition from Lick Observatory to the southern hemisphere are published in Bulletin No. 75 of that observatory.

Twelve stars have been found by Prof. Wright and Dr. Palmer to be spectroscopic binaries, some of them, mentioned below, having features of especial interest. α Phœnicis has a period of about 190 days. The system of θ Eridani has been found to be very similar to that of Mizar, the brightest component, θ_1 , having a composite spectrum similar to that of the star named. α Puppis, α Volantis, α Carinæ, and κ and ϕ Velorum are amongst the other stars of which the radial velocities have been found to be variable.

DOUBLE "CANALS" ON MARS IN 1903.—In Bulletin No. 15 of the Lowell Observatory Mr. Lowell gives, and discusses in detail, the results of his observations of the Martian "canals" during 1903. Before proceeding to the account of the actual observations, he comments on the various theories which have been advanced in argument against the reality of the "doubling" phenomenon. The "diplopic" or out-of-focus theory is refuted for five reasons, the chief of which is that for any special epoch the width of each individual double canal remains constant.

The "interference" theory is met by the statements that in the case of these features there is no bright streak such as would be necessary to produce the two dark streaks to give the idea of a double canal, and that the width of each double canal does not vary with the aperture employed. Lastly, the "illusion," or, as Mr. Lowell refers to it, the "Small Boy," theory is considered,